

LUBRICANT COMPOSITION

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims the benefit of United States Provisional Patent Application, Serial No. 60/455,986 filed March 20, 2003, the contents of which are hereby incorporated herein by reference.

FIELD OF THE INVENTION.

The present invention relates to the field of lubricants, and in particular to a petrolatum-based lubricant composition that is nonflammable and which includes an extreme pressure additive. The lubricant composition is suitable for marine and automotive applications.

BACKGROUND OF THE INVENTION.

Lubricants have a wide variety of uses. In industrial applications these uses range from involvement in many aspects of manufacturing and processing, to uses in engines, transmissions, and other areas where there is generally a metal to metal contact. The basic purpose is to allow a smooth movement between the surfaces, and prevent wear or seizing which is caused by metal-to-metal contact, or heat from the friction of contact. Applications can range from general, household-type uses, such as lubrication of hinges, doors, drawers, to automotive, aerospace, marine or other specialized uses.

A lubricant may be described as being either a natural or a synthetic lubricant. Natural lubricants are generally petroleum-based. Synthetic lubricants comprise agents such as hydrocarbons, esters, phosphate esters, polyglycols, halogenated hydrocarbons, silicones, silicon esters, polyphenyl ethers, or compounds such as

1 polytetrafluoroethylene ("PTFE". sold commercially under the registered trademark of
2 TEFLON®, DuPont, Wilmington, DE), PTFE--containing and related compounds, and
3 the like. Those skilled in the art are aware of the advantages of synthetic lubricants
4 compared to natural lubricants, such as, but not limited to, their tendency to last longer
5 than natural lubricants, greater stability at high temperatures, greater viscosity indexes
6 and lower pour points.

7
8 Additives have been developed to improve the properties of a base lubricant in
9 order to, such as, for example only, prevent corrosion, prevent the formation of rust or
10 other oxidation products, improve wear or heat resistance, improve fuel economy of an
11 engine, or the like. Each additive agent is selected to impart a particular characteristic
12 to the base lubricant so as to provide a finished lubricating composition which is stable
13 and has the desired properties for use in particular applications.

14
15 Additives have been developed to prevent damage to the underlying metal
16 components when the lubricant is used in extreme pressure ("EP") applications.
17 Examples of such uses include, either individually or in combination, high load, high
18 temperature, low speed, low lubricant viscosity, or an inadequate lubricant supply. In
19 addition to their functions in protecting the metal surfaces from corrosion, as well as
20 deterioration due to heat or oxidation, EP lubricants protect the surfaces from scoring
21 and other forms of mechanical distress that occur. A number of agents have been
22 described which function as extreme pressure additives, and these agents have been
23 employed in various combinations with other base lubricants to produce a variety of
24 extreme pressure lubricant compositions.

25
26 Extreme pressure additives have been described as being a special class of
27 boundary lubrication additives which chemically react with the metal surface to form
28 compounds with a lower shear strength than the metal. The resultant low shear
29 compound thus provides the requisite lubrication (U.S. Pat. No. 6,028,038).

1 U.S. Pat. No. 4,902,438 discloses the synthesis and use of thioisothiureas as
2 extreme pressure additives. A recognized problem with lubricants comprising sulfur
3 containing additives is their production of an unpleasant odor.
4

5 Halogenated additives tend to be corrosive, because the commonly used
6 halogen is chlorine, which reacts to form hydrochloric acid upon breakdown of the
7 additive, causing corrosion of the surfaces to which it has been applied.
8

9 Petrolatum is derived from petroleum, where it is generally obtained as an
10 intermediate in the preparation of microcrystalline waxes. The purity of a petrolatum
11 preparation affects its ultimate uses. Some petrolatum preparations (generally, the
12 more highly purified) are pharmaceutically acceptable, meeting United States
13 Pharmacopeia ("U.S.P.") or U.S. Food and Drug Administration ("FDA") requirements
14 under 21 CFR. These more refined petrolatums are used in cosmetics, such as for skin
15 conditioning or hair treatment; in petroleum jelly, as a medical lubricant; in
16 pharmaceuticals, as either a base for ointments, or for preparing semisolid dosage
17 forms. Less refined petrolatums have industrial uses, such as lubricants or
18 components of protective coating compositions. One example is their use in electrical
19 equipment as lubricants, insulating media or in hydraulic fluids.
20

21 Other uses of petrolatum products include lubricants for pharmaceutical
22 equipment, O-ring lubricants, and as a wire or cable pulling lubricant, wherein it can be
23 blended into a grease for use on wire ropes and exposed gears. Petrolatum products
24 can also be used as mold release agents, such as in the manufacturing of concrete and
25 plastic items and the like. Other known uses include rust preventing agents.
26

27 Petrolatum based lubricants have not generally been used in applications
28 involving high temperatures or high pressures. The present inventor has developed a
29 petrolatum-based, nonflammable synthetic lubricant composition including an extreme
30 pressure additive.

1 BRIEF SUMMARY OF THE INVENTION.

2
3 An object of the present invention is to provide a lubricant composition which is
4 nonflammable.

5
6 Another object of the present invention is to provide a nonflammable lubricant
7 composition for use in automotive and marine applications.

8
9 Still another object of the present invention is to provide a nonflammable
10 lubricant composition which can be used in extreme pressure applications.

11
12 Another object of the present invention is to provide a petrolatum-based lubricant
13 composition which is nonflammable.

14
15 Still another object of the present invention is to provide a petrolatum-based
16 lubricant composition which can be used in extreme pressure applications.

17
18 Another object of the present invention is to provide an extreme pressure
19 lubricant for use in automotive and marine applications.

20
21 This inventor has unexpectedly found that addition of an effective amount of an
22 extreme pressure additive to a petrolatum-based lubricant composition can impart
23 enhanced lubricating properties to the base composition.

24
25 The present invention composition is a nonflammable lubricant which comprises,
26 in percent by weight: approximately 4 % carbon dioxide, as a propellant; approximately
27 0.125% SARKOSYL O® (Ciba® SARKOSYL O, Ciba Specialty Chemicals, Tarrytown
28 NY); approximately 0.125% AMINE O (Ciba® AMINO O, Ciba Specialty Chemicals,
29 Tarrytown NY); approximately 78% to approximately 81% trichloroethylene,
30 approximately 10% to approximately 20% petrolatum; approximately 0.44% methyl

1 salicylate, and approximately 0.5% to approximately 5% MONALUBE 225® (ICI
2 Americas, distributed by Uniqema, New Castle, DE).

3
4 Preferably the composition of the present invention comprises approximately
5 1.5% MONALUBE 225®, and between approximately 78% to approximately 81%
6 trichloroethylene.

7
8
9 DETAILED DESCRIPTION OF THE INVENTION.

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11 The present invention is a petrolatum-based lubricant composition for use in
12 numerous industrial, commercial and residential or household applications, such as, for
13 example only and not intended to be a limitation, on engine assemblies, chains,
14 machinery, or on surfaces which surfaces are exposed to conditions which may lead to
15 rust formation or corrosion. The composition of the present invention can also be used
16 for general lubricating purposes, and has particular use in automotive and marine
17 applications.

18
19 The composition of the present invention is capable of displacing water; thus, it
20 can be used to dry wet cables and prevent them from being wetted. The composition of
21 the present invention can be applied to fasteners such as vehicular lug nuts, bolts,
22 screws and the like, to prevent them from locking up, and to facilitate their removal.
23 The present invention can be used as a penetrating solution to loosen fasteners that
24 may have become difficult to remove because of oxidation or other forms of corrosion,
25 and it can be used as a rust-prevention agent. The present invention comprises a
26 synthetic, petrolatum-based composition which includes a non-halogenated extreme
27 pressure, friction reducing, antiwear additive, to enhance its' wear resistant properties.
28 This antiwear additive is sold commercially under the trade name MONALUBE 225®
29 (ICI Americas, Wilmington, DE). When the composition of the present invention is
30 applied to a metal surface, it forms a bond that modifies surfaces to provide protection.

1 Further, because the aerosol formulation of the composition of the present invention is
2 not flammable, this composition provides an additional safety factor when it is used in
3 industrial environments, particularly where solvents or other volatile agents may be
4 present..
5

6 The lubricant composition of the present invention is summarized in Table 1. All
7 reagents are available from commercial suppliers. Ciba® SARKOSYL O is a product
8 of Ciba Specialty Chemicals, Tarrytown NY; for their brand of N-acyl sarcosine.
9 According to the manufacturer, SARKOSYL O is characterized by being a clear, yellow
10 to brown liquid, having a viscosity (at 40 degrees C) of 350 mm²/s, a density (at 20
11 degrees C) of 0.96 g/cubic centimeter, and a flash point of > 130 degrees C (COC).
12

13 In the composition of the present invention, SARKOSYL O can be used at a
14 concentration ranging from approximately 0.03 - approximately 1%; preferably at a
15 concentration of approximately 0.03 - approximately 0.50%, and more preferably is
16 employed at a concentration of approximately 0.125%.
17

18 Ciba® AMINE O is a product of Ciba Specialty Chemicals, Tarrytown NY; for
19 their brand of a substituted imidazoline. According to the supplier, it is characterized by
20 being a clear, slightly viscous yellow to brown liquid, having a viscosity (at 40 degrees
21 C) of 107mPas, a density (at 20 degrees C) of 0.94 g/cubic centimeter, and a flash
22 point of 175 degrees C (COC).
23

24 In the composition of the present invention, AMINE O can be used at a
25 concentration ranging from approximately 0.05 - approximately 2%; preferably at a
26 concentration of approximately 0.05 - approximately 1%; and more preferably is
27 employed at a concentration of approximately 0.125%.
28

29 MONALUBE 225® is a registered trademark of ICI Americas Inc, for their brand
30 of a phosphate ester which can be used as an extreme pressure/anti-wear additive

1 .MONALUBE 225® is distributed by Uniqema (New Castle, DE). According to the
2 distributor's product information bulletin, MONALUBE 225® is a liquid characterized by:

3 -- acidity (meq/g)	2.49-3.12
4 -- an acid number (mg KOH/g)	139.4-174.9
5 -- moisture content (K.F.)	1% maximum
6 -- phosphorus content	3.0-4.0%
7 -- viscosity at 40 degrees C	2219 (mm ² /s)

8
9 MONALUBE 225® is described as having emulsification and anti-corrosion properties,
10 and as being free from heavy metals and chlorine. The absence of chlorine is
11 beneficial, because compounds containing chlorine are known to be corrosive, due to
12 their breakdown during use and subsequent formation of hydrochloric acid.

13
14 MONALUBE 225® is added to the composition in the range of between
15 approximately 1% to approximately 5% by weight, with approximately 1.5% being a
16 preferred concentration. The quantity of trichloroethylene is reduced in proportion to
17 the quantity of MONALUBE 225® added. This additive provides the composition with
18 improved lubrication under high load conditions, thereby reducing friction and heat that
19 can result in excessive heat build-up which can cause extensive parts wear.

20
21 In the composition of the present invention, carbon dioxide (CO₂) can be used at
22 a concentration ranging from between approximately 2 - approximately 8%; preferably
23 at a concentration of approximately 3 - approximately 6%; and more preferably is
24 employed at a concentration of approximately 4.0%.

25
26 Trichloroethylene can be used In the composition of the present invention at a
27 concentration ranging from between approximately 70 - approximately 90%; preferably
28 at a concentration of approximately 75 - approximately 85%; and more preferably is
29 employed at a concentration of approximately 79% (78.81%).
30

Petrolatum, in the form of White Fonoline Petrolatum, can be used in the present invention at a concentration ranging from between approximately 10 - approximately 20%; preferably at a concentration of approximately 12 - approximately 18%; and more preferably is employed at a concentration of approximately 15%.

Methyl salicylate, In the composition of the present invention, can be used at a concentration ranging from between approximately 0.1 - approximately 1.0%; preferably at a concentration of approximately 0.2 - approximately 0.6%; and more preferably is employed at a concentration of approximately 0.44%.

The weights of the ingredients are adjusted such that the total percentage, by weight, equals 100%.

In addition to its lubricating properties, the composition of the present invention is nonflammable, unlike several commercially available aerosol lubricants, thus providing an additional safety factor in its use.

Therefore, although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made only by way of illustration and that certain changes in the composition may be resorted to without departing from the spirit and scope of the invention.